Healthcare-Associated Infection (HAI)

Agent: Any infectious agent (e.g., bacteria, virus, or fungus)
Mode of transmission: Person-to-person transmission via direct contact with an infected person, or by indirect contact with contaminated medical devices or equipment, environmental surfaces, or the hands of healthcare workers. Medical devices may include central lines (can lead to central line-associated bloodstream infections or CLABSIs) and urinary catheters (can lead to catheter-associated urinary tract infections or CAUTIs). A *central line* is a flexible tube that is inserted into one of the large veins or arteries near the patient's heart that can be used to give fluids or medications or measure the amount of fluid in the body. Because a central line is located in a blood vessel, any introduction of bacteria, viruses, or fungi during central line insertion, maintenance, or removal may lead to a bloodstream infection. A *urinary catheter* is a tube that is inserted into the bladder and is used to drain urine. Similar to central lines, any introduction of an infectious agent during catheter insertion, maintenance, or removal may lead to a urinary tract infection.
Signs/symptoms: Varies depending on the type of healthcare-associated infection. May include symptoms such as fever, chills, low blood pressure, diarrhea, or redness/tenderness at the device insertion or surgical site. Most types of infections also require a positive laboratory result identifying an organism.
Prevention: To prevent HAIs, healthcare providers should follow CDC infection prevention guidelines, including: using antibiotics appropriately; removing unnecessary medical devices; complying with recommended practices for hand hygiene, device insertion, and device maintenance; using appropriate personal protective equipment; using evidence-based methods to clean, disinfect, and sterilize medical equipment and devices, as well as clean and disinfect the healthcare environment; and following standard and transmission-based precautions meticulously.
Other important information: Hospitals are required to provide information on HAIs to the Virginia Department of Health (VDH) via the Centers for Disease Control and Prevention's online surveillance system, the National Healthcare Safety Network (NHSN). Hospitals first began reporting CLABSI data to VDH in July 2008. On September 25, 2015, the Virginia HAI reporting regulations were amended to expand the amount of HAI data that is shared with VDH. The updated regulations align reporting to the state health department with what hospitals are already reporting to the NHSN for the purposes of complying with the Centers for Medicare and Medicaid Services Hospital Inpatient Quality Reporting Program. Under the regulations, the state reporting requirements include: CLABSI in intensive care units and select inpatient wards; CAUTI in adult and pediatric intensive care units and select inpatient wards; surgical site infections (SSIs) following abdominal hysterectomy and colon procedures; *Clostridium difficile* laboratory-identified events; methicillin-resistant *Staphylococcus aureus* bacteremia laboratory-identified events; and healthcare personnel influenza vaccination summary data. More information about NHSN is available here: www.cdc.gov/nhsn. Data on healthcare personnel influenza vaccination are found in the Influenza chapter of this annual report.

In 2016, 78 acute care hospitals reported HAI data to VDH for one or more types of infections. Reports of hospital-specific and statewide data are available on the VDH HAI Program's public reporting website: http://www.vdh.virginia.gov/surveillance-and-investigation/healthcare-associated-infections-hais/public-reporting-of-hai-data-in-virginia/. Critical access hospitals now

have separate infection ratio risk models and because they are not mandated to report to VDH, their data have been excluded from this report.

Table 8 shows the statewide summary of the number of infections and standardized infection ratios (SIRs), and 95% confidence intervals (CIs) for all reportable HAIs in 2016. The SIR is a summary measure that adjusts for differences between hospitals, such as types of patients and procedures. It compares the number of infections reported in a given time period to the number of infections that would be predicted using national data from a baseline time period. Data reported to NHSN in the calendar year 2015 serve as the new baseline for SIR calculations. Beginning with 2015 data, updated risk-adjustment models are now used to measure HAI prevention progress in comparison to infection data reported to NHSN. An SIR equal to 1.0 indicates that the number of infections reported during the surveillance period is the same as the number of infections predicted given the baseline data. A lower SIR indicates better performance. A summary of the data reported by Virginia acute care hospitals in 2016 is provided below:

- There were 24% fewer central line-associated bloodstream infections (CLABSIs) in Virginia acute care hospitals than predicted based on the national experience from 2015. This was a statistically significant reduction from the national baseline.
- There were about the same number of catheter-associated urinary tract infections (CAUTIs) in Virginia acute care hospitals as predicted based on the national experience from 2015.
- There were about the same number of surgical site infections (SSIs) following abdominal hysterectomies and about the same number of SSIs following colon surgeries in adult patients in Virginia acute care hospitals as predicted based on the national experience from 2015.
- There were 14% fewer hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia laboratory-identified events in Virginia acute care hospitals than predicted based on the national experience from 2015. This was a statistically significant reduction from the national baseline.
- There were about the same number of hospital-onset *Clostridium difficile* laboratory-identified events in Virginia acute care hospitals as predicted based on the national experience from 2015.

Outbreaks reported from healthcare settings are described in the Outbreaks chapter of this annual report. In 2016, 81 outbreaks were reported from healthcare settings, including 44 suspected or confirmed to be due to norovirus, 18 suspected or confirmed to be due to influenza, and 19 suspected or confirmed to have another pathogen identified as a causal agent.

Table 8. Statewide Standardized Infection Ratios (SIRs) for Central Line-Associated Bloodstream Infection (CLABSI), Catheter-Associated Urinary Tract Infection (CAUTI), Surgical Site Infection (SSI), and Laboratory-Identified Hospital-Onset Methicillin-Resistant *Staphylococcus aureus* (MRSA) Bacteremia and *Clostridium difficile* (CDI) Laboratory-Identified Events; Virginia Acute Care Hospitals; 2016

				Number of Infections		Standardized Infection Ratio (SIR) and 95% CI		
HAI	**Unit/Type**	**No. of Facilities**	**Device Days/ Procedures Performed/ Patient Days**	**Observed**	**Predicted**	**SIR**	**Lower**	**Upper**
CLABSI	**All ICUs[b] and Wards[c] (total)**	78	429,493	313	411.88	0.76	0.68	0.85
	Adult and Pediatric ICUs[b] (only)	75	197,384	159	203.79	0.78	0.67	0.91
	Adult and Pediatric Wards[c] (only)	78	200,295	119	165.70	0.72	0.60	0.86
	Neonatal ICUs (only)	25	30,741	33	41.31	0.80	0.56	1.11
CAUTI	**All ICUs[b] and Wards[c] (total)**	78	437,203	474	476.49	1.00	0.91	1.09
	Adult and Pediatric ICUs[b] (only)	75	223,068	303	290.30	1.04	0.93	1.17
	Adult and Pediatric Wards[c] (only)	78	213,374	168	185.51	0.91	0.78	1.05
SSI Adult[a]	**Colon Surgery**	74	7,594	209	182.95	1.14	1.00	1.31
	Abdominal Hysterectomy	65	8,347	53	52.11	1.02	0.77	1.32
MRSA	**Facility-wide LabID**	78	3,453,257	177	205.81	0.86	0.74	0.99
CDI	**Facility-wide LabID**	78	3,146,854	2,312	2,400.26	0.96	0.93	1.00

Green highlighting indicates an SIR significantly LOWER than the national baseline. Baseline period for CLABSI, CAUTI, SSI, MRSA, and CDI is calendar year 2015.
Red highlighting indicates an SIR significantly HIGHER than the national baseline.
[a]SSI SIRs are based on the complex admission/readmission model. For more information on this model, go to: http://www.cdc.gov/nhsn/pdfs/pscmanual/9pscssicurrent.pdf
[b]NHSN has a separate CLABSI and CAUTI risk model for oncology intensive care units (ICUs); these data are not shown separately here. Oncology ICUs are included in the total for CLABSI and CAUTI but are excluded from the ICU only data.
[c]Inpatient ward locations included are adult and pediatric medical, surgical, and medical/surgical wards.